



SEQUENCE LISTING

<110> Lu, Shan
Pal, Ranajit
Kalyanaraman, V.S.
Whitney, Stephen Charles
Keen, Tim

<120> POLYVALENT, PRIMARY HIV-1 GLYCOPROTEIN
DNA VACCINES AND VACCINATION METHODS

<130> 07917-269001

<140> US 10/728,195

<141> 2003-12-03

<150> US 60/430,732

<151> 2002-12-03

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 ctggaaagat ttgcgcttaa ccctggcctt ttagaaacat cagaaggctg taaacaaata 180
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 ggaaggccag ggaatttcct tcagaacagg ccagagccaa cagccccacc agcagagagc 1380
 ttcaggttcg aggagacaac ccccgctccg aagcaggagt cgaaagacag ggaagcctta 1440
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<220>
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 ctggagcggg tcgcaactgaa tcttggcctc ctggagacca gcgaaggatg caaacagatc 180
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<210> 7

<211> 1422

<212> DNA

<213> Human immunodeficiency virus

<400> 7

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tgtgtaccca	cagaccccaa	cccacaagaa	gtagaattgg	aaaatgtgac	agaaaatttt	180
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cagaaagaat	atgcactttt	ttatgaactt	gatatagtac	caatagataa	taatagtaat	480
aatagatata	ggttgataag	ttgtaacacc	tcagtcatta	cacaggcctg	tccaaagata	540
tcctttgagc	caattcccat	acattattgt	gccccggctg	gttttgcgat	tctaaagtgt	600
aaagataaga	agttcaatgg	aaaaggacca	tgttcaaatg	tcagcacagt	acaatgtaca	660
catgggatta	ggccagtagt	atcaactcaa	ctgctgttaa	atggcagctc	agcagaagaa	720
gaggtagtaa	ttagatccga	aaatttcgcg	gacaatgcta	aaaccataat	agtacagctg	780
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acaagagatg	gtggtccaga	ggcaaacaag	accgaggtct	tcagacctgg	aggaggagat	1320
atgagggaca	attggagaag	tgaattatat	aaatataaag	tagtaaaaaa	tgaaccatta	1380
ggagtagcac	ccaccaaggc	aaagagaaga	gtggtggagt	aa		1422

<210> 8

<211> 1422

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimized gp120.Bal DNA sequence

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ggcgtggccc	ccaccaaggc	caagcgccgc	gtggtggagt	aa		1422

<210> 9

<211> 1422

<212> DNA

<213> Human immunodeficiency virus

<400> 9

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caaagcctaa	agccatgtgt	aaaattaacc	ccactctgtg	ttactctaaa	ttgcaccaat	300
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<211> 1422

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimized gp120.B DNA sequence

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<210> 11

<211> 1443

<212> DNA

<213> Human immunodeficiency virus

<400> 11

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<210> 12

<211> 1464

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimized gp120.Czm DNA sequence

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gaggtggggc	gcgccatgta	cgcccccccc	atcgagggca	acatcgccctg	caagagcgac	1260
atcacccggc	tgctgctggg	gcgcgacggc	ggcagcacca	acgacagcac	caacaacaac	1320
accgagatct	tccgccccgc	cggcgggcag	atgcgcgaca	actggcgagc	cgagctgtac	1380
aagtacaagg	tggtggagat	caagcccctg	ggcatcgccc	ccaccgaggc	caagcgccgc	1440
gtggtggagc	gcgagaagcg	ctga				1464

<210> 13

<211> 1407

<212> DNA

<213> Human immunodeficiency virus

<400> 13

ttgtgggtca	cagtotatta	tggggtaact	gtgtggaaag	atgcagatac	caccctatct	60
tgtgcatcag	atgccaaagc	acatgagaca	gaagtgcaca	atgtctgggc	cacacatgcc	120
tgtgtaccca	cagaccccaa	cccacaagaa	atacacctgg	aaaatgtaac	agaaaatctt	180

aacatgtgga	aaaataaaaat	ggtagagcag	atgcaggagg	atgtaatcag	tttatgggat	240
caaagtctaa	agccatgtgt	aaagttaact	cctctctgcg	ttactttgac	ttgtaccaat	300
gctactctga	attgtaccaaa	tttgaccaat	ggcaataaga	caactaatgt	ctctaacata	360
ataggaaatc	taacagatga	agtaagaaac	tgttcttttc	atatgaccac	agaactaaga	420
gataagaagc	agaaggtcta	tgcacttttt	tataagcttg	atatagtaca	aattaatagt	480
agtgagtata	ggttaataaaa	ttgtaatact	tcagtcatta	agcaggcttg	tccaaagata	540
tcctttgatc	caattcctat	acattattgt	actccagctg	gttatgcat	tttaaagtgt	600
aatgataaga	atttcaatgg	gacagggcca	tgtaaaaatg	tcagctcagt	acaatgcaca	660
catggaatta	agccagtggg	atcaactcaa	ttgctgttaa	atggcagtct	agcagaagaa	720
gagataataa	tcagctctga	aaatctcaca	aacaatgcca	aaaccataat	agtgcacctt	780
aataaatctg	tagaaatcag	ttgtaccaga	ccctccacca	atacaagaac	aagtatacgt	840
ataggaccag	gacaagtatt	ctatagaaca	ggagacataa	caggagatat	aagaaaagca	900
tattgtgaga	ttaatgaaac	aaaatggaat	gaagctttta	aacaggtagc	tgggaaatta	960
aaagaacact	ttaataagac	aataatcttt	caaccaccct	caggaggaga	tctagaaatt	1020
acaatgcac	attttaattg	tagaggggaa	tttttctatt	gcgatacaac	acaactgttt	1080
aatagaactt	ggggagaaaa	tgaaccaga	gaggggcgta	atatcacact	tccatgcaag	1140
ataaagcaaa	ttgtaaacat	gtggcagggg	gcagggcaag	caatgtatgc	tcctcccatc	1200
agtggaataa	ttaagtgtgt	atcaaataat	acaggaatac	tattgacaag	agatgggtgg	1260
gctaataatt	cggctagtga	gaccttcaga	cctggaggag	gaaatataaa	ggacaattgg	1320
agaagtgaat	tatataaata	taaagtagta	caaattgaac	cactaggaat	agcaccacc	1380
agggcaaaga	gaagagtggg	ggagtaa				1407

<210> 14

<211> 1407

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimized gp120.E DNA sequence

<400> 14

ctgtgggtga	ccgtgtacta	cggcgtgccc	gtgtggaagg	acgccgacac	caccctgttc	60
tgcgccagcg	acgccaaggc	ccacgagacc	gaggtgcaca	acgtgtgggc	caccacgcc	120
tgcgtgcca	ccgaccccaa	ccccaggag	atccacctgg	agaacgtgac	cgagaacttc	180
aacatgtgga	agaacaagat	ggtggagcag	atgcaggagg	acgtgatcag	cctgtgggac	240
cagagcctga	agccctgctg	gaagctgacc	cccctgtgcg	tgaccctgac	ctgcaccaac	300
gccaccctga	actgcaccaa	cctgaaccaac	ggcaacaaga	ccaccaacgt	gagcaacatc	360
atcggaacc	tgaccgacga	ggtgcgcaac	tgcagcttcc	acatgaccac	cgagctgctg	420
gacaagaagc	agaaggtgta	cgccctgttc	tacaagctgg	acatcgtgca	gatcaacagc	480
agcgagtacc	gcctgatcaa	ctgcaacacc	agcgtgatca	agcaggcctg	ccccaaagac	540
agcttcgacc	ccatcccat	ccactactgc	acccctgctg	gctacgccat	cctgaagtgc	600
aacgacaaga	acttcaacgg	caccggaccc	tgcaagaacg	tgagcagcgt	gcagtgcacc	660
cacggcatca	agcccggtgg	gagcaccacg	ctgctgctga	acggcagcct	ggccgaggag	720
gagatcatca	tcagcagcga	gaacctgacc	aacaacgcca	agaccatcat	cgtgcacctg	780
aacaagagcg	tggagatcag	ctgcactcgc	cccagcacca	acaccgcac	cagcatccgc	840
atcggaacctg	gccaggtggt	ctaccgcacc	ggcgacatca	ccggcgacat	ccgcaaggcc	900
tactgcgaga	tcaacgagac	caagtggaac	gaggccctga	agcagggtgg	cggcaagctg	960
aaggagcact	tcaacaagac	catcatcttc	cagcctccca	gcggaggcga	cctggagatc	1020
accatgcacc	acttcaactg	cagaggcgag	ttcttctact	gcgacaccac	ccagctgttc	1080
aaccgcacct	ggggcgagaa	cgagaccgcg	gagggcagga	acatcacctt	gccctgcaag	1140
atcaagcaga	tcgtgaacat	gtggcagggg	gctggccagg	ccatgtacgc	cccacccatc	1200
agcggcatca	tcaagtgcgt	gagcaacatc	accggcatcc	tgctgaccgc	cgacggcggt	1260
gccacaaca	gcgccagcga	gaccttcagg	ccaggcggtg	gcaacatcaa	ggacaactgg	1320
cgcagcgagc	tgtacaagta	caaggtgggtg	cagatcgagc	ccctgggcat	cgccccact	1380
cgcgccaagc	gccgcgtggg	ggagtaa				1407

<210> 15

<211> 1410
 <212> DNA
 <213> Human immunodeficiency virus

<400> 15

ttgtgggtca	cagtctatta	tggggtaact	gtgtggaaag	atgcagagac	taccttattt	60
tgtgcatcag	atgcgaaagc	atatgatata	gaagtgcata	atgtctgggc	tacgcatgcc	120
tgtgtacctt	cagaccccaa	cccacaagaa	atatatatgg	aaaatgtgac	agaagagttt	180
aacatgtgga	aaaataacat	ggtagagcag	atgcatacag	atataatcag	tctatgggac	240
caaagccctaa	aacctatgtg	acagttaacc	cctctctgcg	ttactttaga	ttgtagctat	300
aacatcacca	ataatatcac	caatagcatc	accaatagct	cagttaacat	gagagaagaa	360
ataaaaaact	gctctttcaa	tatgaccaca	gaattaaggg	ataagaatcg	gaaggatat	420
tcactttttt	ataaacttga	tgtagtacaa	attaataatg	gtaataacag	tagtaatctg	480
tatagattaa	taaattgtaa	tacctcagcc	cttacacagg	cttgtccaaa	ggtaaccttt	540
gagccaattc	ccatacggtt	ttgtgcccc	gctggttatg	cgattctaaa	atgtaatgat	600
aaggagttca	atggaacagg	gctatgcaaa	aatgtcagca	cagtgcattg	cacacatgga	660
atcaggccag	tagtatcaac	tcaactgctg	ttaaatggca	gttttagcaga	aggaaaggta	720
atgattagat	ctgaaaatat	cacaaacaat	gtcaaaaaca	taatagtaca	acttaacgag	780
actgtaacaa	ttaattgtac	cagacctaac	aacaatacaa	gaaaaagtgt	acgtatagga	840
ccaggacaaa	cattctatgc	aacagggtgat	ataatagggg	atataagaca	agcacattgt	900
aatgtcagtg	ggtcacaatg	gaatagagct	ttacaccagg	tagttggaca	attaagagaa	960
tactggaaca	caacaataat	ctttaaaaac	tcctcaggag	gggattttaga	aattacaaca	1020
catagtttta	attgtggagg	agaatttttc	tattgtaata	catcaggcct	gtttaatagt	1080
aattggacac	ataatgacac	tgccagcatg	aaaccaaattg	acactataac	actcccatgc	1140
agaataaagc	aaattataaa	tatgtggcag	agagtaggac	aagcaatata	tgcccctccc	1200
attcaaggag	taataagggtg	tgaatcaaac	attacaggac	taatattaac	aagagatggg	1260
gggggtaaca	tcaatgaaag	tcaaatcttc	agacctggag	gaggagatat	gagggacaat	1320
tggagaagtg	aattatataa	gtataaggta	gtaagaattg	aaccactagg	agtagcacc	1380
accaaggcaa	agagaagagt	ggtggagtaa				1410

<210> 16
 <211> 1410
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon optimized gp120.A DNA sequence

<400> 16

ctgtgggtga	ccgtgtacta	cggcgtgccc	gtgtggaagg	acgccgagac	caccctgttc	60
tgcgccagcg	acgccaaggc	ctacgacacc	gagggtgcaca	acgtgtgggc	caccacgcc	120
tgcgtgcccc	ccgaccccaa	ccccaggag	atctacatgg	agaacgtgac	cgaggagttc	180
aacatgtgga	agaacaacat	ggtggagcag	atgcacaccg	acatcatcag	cctgtgggac	240
cagagcctga	agccctgcgt	gcagctgacc	cccctgtgcg	tgaccctgga	ctgcagctac	300
aacatcacca	acaacatcac	caacagcatc	accaacagca	gcgtgaacat	gcgcgaggag	360
atcaagaact	gcagcttcaa	catgaccacc	gagctgcgcg	acaagaaccg	caaggtgtac	420
agcctgttct	acaagctgga	cgtgggtgcag	atcaacaacg	gcaacaacag	cagcaacctg	480
taccgcctga	tcaactgcaa	caccagcgcc	ctgacccagg	cctgccccaa	ggtgaccttc	540
gagcccatcc	ccatccgcta	ctgcgcccc	gccggctacg	ccatcctgaa	gtgcaacgac	600
aaggagttca	acggcaccgg	cctgtgcaag	aacgtgagca	ccgtgcagtg	caccacgggc	660
atccgccccg	tgggtgagcac	ccagctgctg	ctgaacggca	gcctggccga	gggcaagggtg	720
atgatccgca	gcgagaacat	caccaacaac	gtgaagaaca	tcacgtgca	gctgaacgag	780
accgtgacca	tcaactgcac	ccgccccaac	aacaacaccc	gcaagagcgt	gcgcatcggc	840
cccgccacaga	ccttctacgc	caccggcgac	atcatcggcg	acatccgcca	ggccactgc	900
aacgtgagcg	gcagccagtg	gaaccgcgcc	ctgcaccagg	tggtggggcca	gctgcgcgag	960
tactggaaca	ccaccatcat	cttcaagaac	agcagcggcg	gcgacctgga	gatcaccacc	1020
cacagcttca	actgcggcgg	cgagttcttc	tactgcaaca	ccagcggcct	gttcaacagc	1080


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aactggaccc acaacgacac cgccagcatg aagcccaacg acaccatcac cctgccctgc 1140
cgcatcaagc agatcatcaa catgtggcag cgcgtgggcc aggccatcta cgccctccc 1200
atccagggcg tgatccgctg cgagagcaac atcaccggcc tgatcctgac ccgcgacggc 1260
ggcggcaaca tcaacgagag ccagatcttc cgccccggcg gcggcgacat gcgcgacaac 1320
tggcgcgagc agctgtacaa gtacaagggtg gtgcgcatcg agcccctggg cgtggccccc 1380
accaaggcca agcgcgcgct ggtggagtaa 1410

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<210> 17

<211> 470

<212> PRT

<213> Human immunodeficiency virus

<400> 17

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Ser Leu Trp Val Thr Val Tyr Tyr Gly Val Pro Val Trp Lys Asp Ala
 1          5          10          15
Glu Thr Thr Leu Phe Cys Ala Ser Asp Ala Lys Ala Tyr Asp Thr Glu
 20          25          30
Val His Asn Val Trp Ala Thr His Ala Cys Val Pro Thr Asp Pro Asn
 35          40          45
Pro Gln Glu Ile Tyr Met Glu Asn Val Thr Glu Glu Phe Asn Met Trp
 50          55          60
Lys Asn Asn Met Val Glu Gln Met His Thr Asp Ile Ile Ser Leu Trp
 65          70          75          80
Asp Gln Ser Leu Lys Pro Cys Val Gln Leu Thr Pro Leu Cys Val Thr
 85          90          95
Leu Asp Cys Ser Tyr Asn Ile Thr Asn Asn Ile Thr Asn Ser Ile Thr
100          105          110
Asn Ser Ser Val Asn Met Arg Glu Glu Ile Lys Asn Cys Ser Phe Asn
115          120          125
Met Thr Thr Glu Leu Arg Asp Lys Asn Arg Lys Val Tyr Ser Leu Phe
130          135          140
Tyr Lys Leu Asp Val Val Gln Ile Asn Asn Gly Asn Asn Ser Ser Asn
145          150          155          160
Leu Tyr Arg Leu Ile Asn Cys Asn Thr Ser Ala Leu Thr Gln Ala Cys
165          170          175
Pro Lys Val Thr Phe Glu Pro Ile Pro Ile Arg Tyr Cys Ala Pro Ala
180          185          190
Gly Tyr Ala Ile Leu Lys Cys Asn Asp Lys Glu Phe Asn Gly Thr Gly
195          200          205
Leu Cys Lys Asn Val Ser Thr Val Gln Cys Thr His Gly Ile Arg Pro
210          215          220
Val Val Ser Thr Gln Leu Leu Asn Gly Ser Leu Ala Glu Gly Lys
225          230          235          240
Val Met Ile Arg Ser Glu Asn Ile Thr Asn Asn Val Lys Asn Ile Ile
245          250          255
Val Gln Leu Asn Glu Thr Val Thr Ile Asn Cys Thr Arg Pro Asn Asn
260          265          270
Asn Thr Arg Lys Ser Val Arg Ile Gly Pro Gly Gln Thr Phe Tyr Ala
275          280          285
Thr Gly Asp Ile Ile Gly Asp Ile Arg Gln Ala His Cys Asn Val Ser
290          295          300
Gly Ser Gln Trp Asn Arg Ala Leu His Gln Val Val Gly Gln Leu Arg
305          310          315          320
Glu Tyr Trp Asn Thr Thr Ile Ile Phe Lys Asn Ser Ser Gly Gly Asp
325          330          335
Leu Glu Ile Thr Thr His Ser Phe Asn Cys Gly Gly Glu Phe Phe Tyr
340          345          350

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Cys Asn Thr Ser Gly Leu Phe Asn Ser Asn Trp Thr His Asn Asp Thr
 355 360 365
 Ala Ser Met Lys Pro Asn Asp Thr Ile Thr Leu Pro Cys Arg Ile Lys
 370 375 380
 Gln Ile Ile Asn Met Trp Gln Arg Val Gly Gln Ala Ile Tyr Ala Pro
 385 390 395 400
 Pro Ile Gln Gly Val Ile Arg Cys Glu Ser Asn Ile Thr Gly Leu Ile
 405 410 415
 Leu Thr Arg Asp Gly Gly Gly Asn Ile Asn Glu Ser Gln Ile Phe Arg
 420 425 430
 Pro Gly Gly Gly Asp Met Arg Asp Asn Trp Arg Ser Glu Leu Tyr Lys
 435 440 445
 Tyr Lys Val Val Arg Ile Glu Pro Leu Gly Val Ala Pro Thr Lys Ala
 450 455 460
 Lys Arg Arg Val Val Gln
 465 470

<210> 18
 <211> 474
 <212> PRT
 <213> Human immunodeficiency virus

<400> 18
 Ser Leu Trp Val Thr Val Tyr Tyr Gly Val Pro Val Trp Lys Glu Ala
 1 5 10 15
 Thr Thr Thr Leu Phe Cys Ala Ser Asp Arg Lys Ala Tyr Asp Thr Glu
 20 25 30
 Val His Asn Val Trp Ala Thr His Ala Cys Val Pro Thr Asp Pro Asn
 35 40 45
 Pro Gln Glu Val Glu Leu Lys Asn Val Thr Glu Asn Phe Asn Met Trp
 50 55 60
 Lys Asn Asn Met Val Glu Gln Met His Glu Asp Ile Ile Ser Leu Trp
 65 70 75 80
 Asp Gln Ser Leu Lys Pro Cys Val Lys Leu Thr Pro Leu Cys Val Thr
 85 90 95
 Leu Asn Cys Thr Asp Leu Arg Asn Ala Thr Asn Gly Asn Asp Thr Asn
 100 105 110
 Thr Thr Ser Ser Arg Gly Met Val Gly Gly Gly Glu Met Lys Asn
 115 120 125
 Cys Ser Phe Asn Ile Thr Thr Asn Ile Arg Gly Lys Val Gln Lys Glu
 130 135 140
 Tyr Ala Leu Phe Tyr Lys Leu Asp Ile Ala Pro Ile Asp Asn Asn Ser
 145 150 155 160
 Asn Asn Arg Tyr Arg Leu Ile Ser Cys Asn Thr Ser Val Ile Thr Gln
 165 170 175
 Ala Cys Pro Lys Val Ser Phe Glu Pro Ile Pro Ile His Tyr Cys Ala
 180 185 190
 Pro Ala Gly Phe Ala Ile Leu Lys Cys Lys Asp Lys Lys Phe Asn Gly
 195 200 205
 Lys Gly Pro Cys Thr Asn Val Ser Thr Val Gln Cys Thr His Gly Ile
 210 215 220
 Arg Pro Val Val Ser Thr Gln Leu Leu Leu Asn Gly Ser Leu Ala Glu
 225 230 235 240
 Glu Glu Val Val Ile Arg Ser Ala Asn Phe Ala Asp Asn Ala Lys Val
 245 250 255
 Ile Ile Val Gln Leu Asn Glu Ser Val Glu Ile Asn Cys Thr Arg Pro
 260 265 270

```

Asn Asn Asn Thr Arg Lys Ser Ile His Ile Gly Pro Gly Arg Ala Phe
  275                280                285
Tyr Thr Thr Gly Glu Ile Ile Gly Asp Ile Arg Gln Ala His Cys Asn
  290                295                300
Leu Ser Arg Ala Lys Trp Asn Asp Thr Leu Asn Lys Ile Val Ile Lys
  305                310                315                320
Leu Arg Glu Gln Phe Gly Asn Lys Thr Ile Val Phe Lys His Ser Ser
                325                330                335
Gly Gly Asp Pro Glu Ile Val Thr His Ser Phe Asn Cys Gly Gly Glu
  340                345                350
Phe Phe Tyr Cys Asn Ser Thr Gln Leu Phe Asn Ser Thr Trp Asn Val
  355                360                365
Thr Glu Glu Ser Asn Asn Thr Val Glu Asn Asn Thr Ile Thr Leu Pro
  370                375                380
Cys Arg Ile Lys Gln Ile Ile Asn Met Trp Gln Glu Val Gly Arg Ala
  385                390                395                400
Met Tyr Ala Pro Pro Ile Arg Gly Gln Ile Arg Cys Ser Ser Asn Ile
                405                410                415
Thr Gly Leu Leu Leu Thr Arg Asp Gly Gly Pro Glu Asp Asn Lys Thr
  420                425                430
Glu Val Phe Arg Pro Gly Gly Gly Asp Met Arg Asp Asn Trp Arg Ser
  435                440                445
Glu Leu Tyr Lys Tyr Lys Val Val Lys Ile Glu Pro Leu Gly Val Ala
  450                455                460
Pro Thr Lys Ala Lys Arg Arg Val Val Gln
  465                470

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<210> 19

<211> 474

<212> PRT

<213> Human immunodeficiency virus

<400> 19

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Ser Leu Trp Val Thr Val Tyr Tyr Gly Val Pro Val Trp Lys Glu Ala
  1                5                10                15
Asn Thr Thr Leu Phe Cys Ala Ser Asp Ala Lys Ala Tyr Asp Thr Glu
  20                25                30
Val His Asn Val Trp Ala Thr His Ala Cys Val Pro Thr Asp Pro Asp
  35                40                45
Pro Gln Glu Val Glu Leu Glu Asn Val Thr Glu Asn Phe Asn Met Trp
  50                55                60
Lys Asn Asn Met Val Glu Gln Met His Glu Asp Ile Ile Ser Leu Trp
  65                70                75                80
Asp Gln Ser Leu Lys Pro Cys Val Lys Leu Thr Pro Leu Cys Val Thr
                85                90                95
Leu Asn Cys Thr Asn Leu Arg Asn Asp Thr Asn Thr Thr Arg Asn Ala
  100                105                110
Thr Asn Thr Thr Ser Ser Glu Thr Met Met Glu Glu Gly Glu Ile Lys
  115                120                125
Asn Cys Ser Phe Asn Ile Thr Thr Ser Ile Arg Asp Lys Val Gln Lys
  130                135                140
Glu Phe Ala Leu Phe Tyr Lys Leu Asp Val Val Pro Ile Glu Asn Asp
  145                150                155                160
Thr Thr Ser Tyr Arg Leu Ile Ser Cys Asn Thr Ser Val Leu Thr Gln
                165                170                175
Ala Cys Pro Lys Val Ser Phe Glu Pro Ile Pro Ile His Phe Cys Ala
                180                185                190

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Pro Ala Gly Phe Ala Ile Leu Lys Cys Lys Asp Lys Lys Phe Asn Gly
 195 200 205
 Thr Gly Pro Cys Thr Asn Val Ser Thr Val Gln Cys Thr His Gly Ile
 210 215 220
 Lys Pro Val Val Ser Thr Gln Leu Leu Leu Asn Gly Ser Leu Ala Glu
 225 230 235 240
 Glu Glu Val Val Ile Arg Ser Ala Asn Leu Ser Asp Asn Ala Lys Thr
 245 250 255
 Ile Ile Val Gln Leu Asn Glu Ser Val Gln Met Asn Cys Thr Arg Pro
 260 265 270
 Asn Asn Asn Thr Arg Lys Ser Ile His Ile Gly Pro Gly Arg Ala Phe
 275 280 285
 Tyr Thr Thr Gly Glu Ile Ile Gly Asp Ile Arg Gln Ala His Cys Asn
 290 295 300
 Leu Ser Arg Thr Lys Trp Asn Glu Thr Leu Lys Arg Ile Val Ile Lys
 305 310 315 320
 Leu Arg Glu Gln Tyr Glu Asn Lys Thr Ile Val Phe Asn Gln Ser Ser
 325 330 335
 Gly Gly Asp Pro Glu Ile Val Met Leu Ser Phe Asn Cys Gly Gly Glu
 340 345 350
 Phe Phe Tyr Cys Asn Ser Thr Lys Leu Phe Asn Ser Thr Trp Asn Gly
 355 360 365
 Thr Glu Ser Asn Asn Thr Gly Asp Asp Pro Ile Val Leu Pro Cys Arg
 370 375 380
 Ile Lys Gln Val Ile Asn Met Trp Gln Glu Val Gly Lys Ala Met Tyr
 385 390 395 400
 Ala Pro Pro Ile Arg Gly Gln Ile Arg Cys Ser Ser Asn Ile Thr Gly
 405 410 415
 Leu Leu Leu Thr Arg Asp Gly Gly Asn Ser Asn Glu Thr Asn Thr Thr
 420 425 430
 Glu Ile Phe Arg Pro Gly Gly Gly Asn Met Lys Asp Asn Trp Arg Ser
 435 440 445
 Glu Leu Tyr Lys Tyr Lys Val Val Arg Ile Glu Pro Leu Gly Ile Ala
 450 455 460
 Pro Thr Arg Ala Lys Arg Arg Val Val Gln
 465 470

<210> 20

<211> 488

<212> PRT

<213> Human immunodeficiency virus

<400> 20

Ser Trp Gly Asn Leu Trp Val Thr Val Tyr Tyr Gly Val Pro Val Trp
 1 5 10 15
 Lys Glu Ala Lys Thr Thr Leu Phe Cys Ala Ser Asp Ala Lys Ser Tyr
 20 25 30
 Glu Lys Glu Val His Asn Val Trp Ala Thr His Ala Cys Val Pro Thr
 35 40 45
 Asp Pro Asn Pro Gln Glu Ile Val Leu Gly Asn Val Thr Glu Asn Phe
 50 55 60
 Asn Met Trp Lys Asn Asp Met Val Asp Gln Met His Glu Asp Ile Ile
 65 70 75 80
 Ser Leu Trp Asp Gln Ser Leu Lys Pro Cys Val Lys Leu Thr Pro Leu
 85 90 95
 Cys Val Thr Leu Asn Cys Thr Glu Val Asn Val Thr Arg Asn Val Asn
 100 105 110

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Asn Ser Val Val Asn Asn Thr Thr Asn Val Asn Asn Ser Met Asn Gly
115 120 125
Asp Met Lys Asn Cys Ser Phe Asn Ile Thr Thr Glu Leu Lys Asp Lys
130 135 140
Lys Lys Asn Val Tyr Ala Leu Phe Tyr Lys Leu Asp Ile Val Ser Leu
145 150 155 160
Asn Glu Thr Asp Asp Ser Glu Thr Gly Asn Ser Ser Lys Tyr Tyr Arg
165 170 175
Leu Ile Asn Cys Asn Thr Ser Ala Leu Thr Gln Ala Cys Pro Lys Val
180 185 190
Ser Phe Asp Pro Ile Pro Ile His Tyr Cys Ala Pro Ala Gly Tyr Ala
195 200 205
Ile Leu Lys Cys Asn Asn Lys Thr Phe Asn Gly Thr Gly Pro Cys His
210 215 220
Asn Val Ser Thr Val Gln Cys Thr His Gly Ile Lys Pro Val Val Ser
225 230 235 240
Thr Gln Leu Leu Leu Asn Gly Ser Leu Ala Glu Glu Gly Ile Ile Ile
245 250 255
Arg Ser Glu Asn Leu Thr Asn Asn Val Lys Thr Ile Ile Val His Leu
260 265 270
Asn Arg Ser Ile Glu Ile Val Cys Val Arg Pro Asn Asn Asn Thr Arg
275 280 285
Gln Ser Ile Arg Ile Gly Pro Gly Gln Thr Phe Tyr Ala Thr Gly Asp
290 295 300
Ile Ile Gly Asp Ile Arg Gln Ala His Cys Asn Ile Ser Arg Thr Asn
305 310 315 320
Trp Thr Lys Thr Leu Arg Glu Val Arg Asn Lys Leu Arg Glu His Phe
325 330 335
Pro Asn Lys Asn Ile Thr Phe Lys Pro Ser Ser Gly Gly Asp Leu Glu
340 345 350
Ile Thr Thr His Ser Phe Asn Cys Arg Gly Glu Phe Phe Tyr Cys Asn
355 360 365
Thr Ser Gly Leu Phe Ser Ile Asn Tyr Thr Glu Asn Asn Thr Asp Gly
370 375 380
Thr Pro Ile Thr Leu Pro Cys Arg Ile Arg Gln Ile Ile Asn Met Trp
385 390 395 400
Gln Glu Val Gly Arg Ala Met Tyr Ala Pro Pro Ile Glu Gly Asn Ile
405 410 415
Ala Cys Lys Ser Asp Ile Thr Gly Leu Leu Leu Val Arg Asp Gly Gly
420 425 430
Ser Thr Asn Asp Ser Thr Asn Asn Asn Thr Glu Ile Phe Arg Pro Ala
435 440 445
Gly Gly Asp Met Arg Asp Asn Trp Arg Ser Glu Leu Tyr Lys Tyr Lys
450 455 460
Val Val Glu Ile Lys Pro Leu Gly Ile Ala Pro Thr Glu Ala Lys Arg
465 470 475 480
Arg Val Val Glu Arg Glu Lys Arg
485

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<210> 21

<211> 469

<212> PRT

<213> Human immunodeficiency virus

<400> 21

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Ser Leu Trp Val Thr Val Tyr Tyr Gly Val Pro Val Trp Lys Asp Ala
1 5 10 15

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Asp	Thr	Thr	Leu	Phe	Cys	Ala	Ser	Asp	Ala	Lys	Ala	His	Glu	Thr	Glu	20	25	30
Val	His	Asn	Val	Trp	Ala	Thr	His	Ala	Cys	Val	Pro	Thr	Asp	Pro	Asn	35	40	45
Pro	Gln	Glu	Ile	His	Leu	Glu	Asn	Val	Thr	Glu	Asn	Phe	Asn	Met	Trp	50	55	60
Lys	Asn	Lys	Met	Val	Glu	Gln	Met	Gln	Glu	Asp	Val	Ile	Ser	Leu	Trp	65	70	75
Asp	Gln	Ser	Leu	Lys	Pro	Cys	Val	Lys	Leu	Thr	Pro	Leu	Cys	Val	Thr	85	90	95
Leu	Thr	Cys	Thr	Asn	Ala	Thr	Leu	Asn	Cys	Thr	Asn	Leu	Thr	Asn	Gly	100	105	110
Asn	Lys	Thr	Thr	Asn	Val	Ser	Asn	Ile	Ile	Gly	Asn	Leu	Thr	Asp	Glu	115	120	125
Val	Arg	Asn	Cys	Ser	Phe	His	Met	Thr	Thr	Glu	Leu	Arg	Asp	Lys	Lys	130	135	140
Gln	Lys	Val	Tyr	Ala	Leu	Phe	Tyr	Lys	Leu	Asp	Ile	Val	Gln	Ile	Asn	145	150	155
Ser	Ser	Glu	Tyr	Arg	Leu	Ile	Asn	Cys	Asn	Thr	Ser	Val	Ile	Lys	Gln	165	170	175
Ala	Cys	Pro	Lys	Ile	Ser	Phe	Asp	Pro	Ile	Pro	Ile	His	Tyr	Cys	Thr	180	185	190
Pro	Ala	Gly	Tyr	Ala	Ile	Leu	Lys	Cys	Asn	Asp	Lys	Asn	Phe	Asn	Gly	195	200	205
Thr	Gly	Pro	Cys	Lys	Asn	Val	Ser	Ser	Val	Gln	Cys	Thr	His	Gly	Ile	210	215	220
Lys	Pro	Val	Val	Ser	Thr	Gln	Leu	Leu	Leu	Asn	Gly	Ser	Leu	Ala	Glu	225	230	235
Glu	Glu	Ile	Ile	Ile	Ser	Ser	Glu	Asn	Leu	Thr	Asn	Asn	Ala	Lys	Thr	245	250	255
Ile	Ile	Val	His	Leu	Asn	Lys	Ser	Val	Glu	Ile	Ser	Cys	Thr	Arg	Pro	260	265	270
Ser	Thr	Asn	Thr	Arg	Thr	Ser	Ile	Arg	Ile	Gly	Pro	Gly	Gln	Val	Phe	275	280	285
Tyr	Arg	Thr	Gly	Asp	Ile	Thr	Gly	Asp	Ile	Arg	Lys	Ala	Tyr	Cys	Glu	290	295	300
Ile	Asn	Glu	Thr	Lys	Trp	Asn	Glu	Ala	Leu	Lys	Gln	Val	Ala	Gly	Lys	305	310	315
Leu	Lys	Glu	His	Phe	Asn	Lys	Thr	Ile	Ile	Phe	Gln	Pro	Pro	Ser	Gly	325	330	335
Gly	Asp	Leu	Glu	Ile	Thr	Met	His	His	Phe	Asn	Cys	Arg	Gly	Glu	Phe	340	345	350
Phe	Tyr	Cys	Asp	Thr	Thr	Gln	Leu	Phe	Asn	Arg	Thr	Trp	Gly	Glu	Asn	355	360	365
Glu	Thr	Arg	Glu	Gly	Arg	Asn	Ile	Thr	Leu	Pro	Cys	Lys	Ile	Lys	Gln	370	375	380
Ile	Val	Asn	Met	Trp	Gln	Gly	Ala	Gly	Gln	Ala	Met	Tyr	Ala	Pro	Pro	385	390	395
Ile	Ser	Gly	Ile	Ile	Lys	Cys	Val	Ser	Asn	Ile	Thr	Gly	Ile	Leu	Leu	405	410	415
Thr	Arg	Asp	Gly	Gly	Ala	Asn	Asn	Ser	Ala	Ser	Glu	Thr	Phe	Arg	Pro	420	425	430
Gly	Gly	Gly	Asn	Ile	Lys	Asp	Asn	Trp	Arg	Ser	Glu	Leu	Tyr	Lys	Tyr	435	440	445
Lys	Val	Val	Gln	Ile	Glu	Pro	Leu	Gly	Ile	Ala	Pro	Thr	Arg	Ala	Lys	450	455	460
Arg	Arg	Val	Val	Gln														

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